

### View results

Respondent

9 Haribansha Timalsina

02:14

Time to complete

### Instructions:

Please adhere to the session word counts. Project leads must attend one SSC working group meeting post step 1 application submission. If you have any questions about the application process, please contact the SSC at [Sustainability-Committee@illinois.edu](mailto:Sustainability-Committee@illinois.edu).

1. Have you attended a SSC working group meeting? \*

Yes

No

2. Project Name: \*

Enhancing water quality through appropriate woodchip mulch and phosphorus filter pairing

3. Total Funding Requested From the SSC. \*

9925

Please enter a number less than or equal to 10000

4. Date of Application \*

09/28/2023

5. Project Lead Full Name: \*

Haribansha Timalsina

6. Project Lead University Email Address \*

ht15@illinois.edu

7. Project Abstract: (In less than 100 words, briefly describe the project.) \*

Woodchip mulch has wide application in urban landscaping for its aesthetic value, moisture, and soil erosion control but is observed to risk the waterbodies by leaching phosphorus which undermines urban/campus sustainability. This project aims to provide sustainable solutions by minimizing the environmental tradeoff of woodchip applications in the campus/urban areas. For this, we aim to investigate the phosphorus leaching potential of woodchips based on their source material using laboratory experiments and suggest the best practices to minimize phosphorus loss through stormwater runoff. Moreover, we will evaluate and design the phosphorus filter pairing/amendment system to mitigate phosphorus discharge into water systems.

8. Project Category \*

- Education & Justice
- Energy
- Food & Waste
- Land, Air & Water
- Transportation & Infrastructure

All rolling application require a faculty/staff advisor.

Faculty and Staff Advisor

9. Full Name: \*

Rabin Bhattarai

10. RSO/Department \*

Department of Agricultural and Biological Engineering

11. University Email Address: \*

rbhatta2@illinois.edu

12. Do you have additional members? \*

- Yes
- No

Project Team Member

Additional Member

13. Full Name: \*

Audrey Frost

14. RSO/Department \*

Undergraduate student at Agricultural and Biological Engineering

15. University Email Address: \*

aefrost2@illinois.edu

16. Do you have additional members? \*

Yes

No

### Project Team Member

Additional Member

17. Full Name: \*

Hongyi Yao Owen

18. RSO/Department \*

Graduate student at Engineering Technology and Management for Agricultural Systems

19. University Email Address: \*

hongyi2@illinois.edu

### UIUC Financial Contact

Financial Contact (Must be full-time UIUC employee)

20. Full Name: \*

Darryl E Negangard

21. RSO/Department \*

Business and Finance Manager at Agricultural and Biological Engineering

22. University Email Address: \*

negangrd@illinois.edu

### Project Questionnaire:

23. Is this project student led? \*

- Yes
- No

24. If applicable, have you received approval from Facilities & Services and/or site manager? \*

- Yes
- No
- N/A

25. If additional funding is required, do you have a plan for ongoing funding beyond SSC? (SSC cannot guarantee ongoing financial support) \*

- Yes
- No

26. Beyond SSC, do you have sources contributing funding or support (ex. staff time, external grants, etc.) to this project? \*

- Yes
- No

27. Have you applied for SSC funding previously? \*

- Yes
- No

**28. Project Timeline:**

(SSC funding agreements remain active for two years. List your project's timeline and major milestones.) \*

Objective 1: Phosphorus leaching laboratory experiment (Spring + Summer+Fall/Winter, 2024)  
 Objective 2: Phosphorus filter pairing/amendment experiment (Fall/Winter, 2024 + Spring + Summer 2025)  
 Objective 3: Results analysis and feasibility assessment (Spring + Summer +fall 2025)  
 Objective 4: Project dissemination via database, conferences, and peer-reviewed journals (Fall/Winter 2025)

**29. Project Description:**

(In 250 words or less, describe your project. What does your project hope to accomplish? What are your project's deliverables?) \*

Woodchip mulching has been a common practice in landscaping because of its aesthetic, economic, and environmental benefits. Moreover, woodchips are globally adopted in bioreactor systems as a cheap carbon source for denitrifying bacteria to remove nitrates from agricultural runoff. However, woodchips leach phosphorus, the most significant toxin leading to eutrophication into water, especially during the early stages of their application. All the mulches, however, are not created equally, and their ecological response depends on the composition of their parental materials. In this project, we aim to envisage the chemistry and leaching potential of woodchip mulch from various sources for informed best management/application in the urban landscape as well as denitrifying bioreactors. Moreover, through a series of laboratory investigations, we aim to design and test the feasibility of pairing or amendment of phosphorus removal systems in the bioreactors.

The specific deliverables of the project are to

- Investigate the Phosphorus leaching/removal potential of various organic woodchip mulch through laboratory experiments.
- Investigate and design suitable amendments in the existing system for minimizing phosphorus release.
- Recommend the appropriate practices of woodchips and amended systems to optimize environmental/economic benefits in urban and agroecosystems.
- Scale up the project value from engineering applications and sustainability aspects via cost-benefit analysis and modeling studies.

The project will benefit the campus, urban, and agricultural communities through appropriate management of the existing mulch application practices for reducing phosphorus contamination in the stream water. Moreover, through the engineering design and ecological/economic assessment, this project offers a practical guide for sustainable water management.

**30. Environmental Impact:**

(In 200 words or less, how does your project increase environmental stewardship at UIUC? If applicable, what is the carbon, water, waste, and/or energy savings?) \*

Recently published campus landscape master plan, UIUC aimed to provide the campus landscapes and spaces to support the region's natural biodiversity and water resources, managing stormwater and green infrastructures. The landscape management also includes the application of woodchip mulch to the plant beds and open spaces, which has the potential to leach phosphorus and contaminate the nearby stream through stormwater runoff.

Phosphorus is the key element that stimulates aquatic plants and algae bloom leading to a phenomenon called eutrophication. It leads to oxygen depletion in the water after the death and decomposition of such plants, posing a threat to aquatic life. Phosphorus alone can consume 110 Oxygen atoms and is 16 times as powerful as Nitrogen in stimulating eutrophication. USEPA guidelines recommend a 0.1 mg-P/L limit to prevent eutrophication, but woodchips are reported to leach 4-10 mg-P/L. The mitigation of the issue, if not eradication, is possible through local actions.

This project directly helps increase the environmental stewardship at UIUC through the awareness of existing yet overlooked environmental concerns and assessment of the issue initiated through the campus. This will help mitigate the water contamination issue at UIUC and the larger community (agricultural and urban areas). Through this integrated approach, the project seeks to establish a benchmark in environmental research and sustainable practices.

**31. iCAP Objective Correspondence:**

(In 200 words or less, does your project aim to advance one or more of the Illinois Climate Action Plan's (iCAP) objectives? If so, how?)

A full list can be found here: <https://icap.sustainability.illinois.edu/objectives>

Our project goals are to address stormwater management, mitigate phosphorus pollution, and ensure cleaner runoff. These goals perfectly align with one of the objectives of the Illinois Climate Action Plan (iCAP) (objective 20) on water and stormwater management: "Investigate the water quality impacts of stormwater runoff and potential ways to reduce stormwater pollutant discharges".

Moreover, our project well complements the research objectives of iCAP (objectives 45-47) by fostering "actionable" research, building connections across the scholars, encouraging collaborations, and enhancing research endeavors. We believe that this project helps to provide real-world solutions to assess the challenges in sustainability and the environment

## 32. Student Impact:

(In 200 words or less, how will this project benefit students? How will students be involved with this project? What educational components are in your project?)

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In this pivotal project, we are taking the initiative to enhance campus sustainability and water environments by mitigating the overlooked environmental threat. This project, steered by graduate students (Haribansha Timalina, Hongxu Zhou, and Owen Yao) from the Agricultural and Biological Engineering department, along with the Undergraduates (Audery Frost and Shuai Lin), aims to address critical challenges of enhancing water quality issues by integrating knowledge from the field and laboratory.

Under the mentorship of Dr. Bhattarai, the student team will design experiments, analyze results, and contribute to scientific literature. Their academic foundation in environmental sustainability will be applied to solving real-world problems, and they will have the opportunity to present their research seminars/conferences and campus newspapers. The project will provide students with hands-on experience and bridge the gap between theoretical knowledge and practical application. It will develop students' critical thinking, problem-solving skills, and teamwork collaboration, preparing them for the challenges of their future careers. Additionally, by being exposed to real-world sustainability issues, students will develop a sense of responsibility and motivation to make a positive impact on the environment. Their efforts in this program are not only for their overall development as future leaders in their careers but also for the betterment of the environment.

## 33. Please see attached file, please be very descriptive and fill out the budget and timeline Excel sheet, and submit it below.

<https://studentengagement.illinois.edu/student-sustainability/ssc/docs/SSC-Supplemental-Budget-Timeline.xlsx>

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 [SSC-Supplemental-Budget-Timeline\\_RB\\_Haribansha Timalina.xlsx](#)